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10/551,696	08/08/2006	Gabor Horvath	BJS-4982-10	7997

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EXAMINER	
COLLINS, CYNTHIA E	

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1638	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/551,696	HORVATH ET AL.	
	Examiner	Art Unit	
	Cynthia Collins	1638	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *02 June 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3-7,9,10 and 12-20* is/are pending in the application.

4a) Of the above claim(s) *6* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3-5,7,9,10 and 12-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *September 30, 2005* is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *8806, 93005*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

Applicant's election with traverse of Group II in the reply filed on June 6, 2002 is acknowledged.

The traversal is on the ground(s) that claim 1 is not included in any of the four groups of invention.

This is not found persuasive because, as set for at page 3 of the restriction requirement mailed March 5, 2008, claim 1 is a linking claim. Since linking claims "must be examined with, and thus are considered part of, the invention elected" (MPEP 809), claim 1, by definition, is to be examined with, and is considered a part of, each of the four groups of invention. For an explanation of restrictions involving linking claims, see MPEP 809.

The traversal is also on the ground(s) that the single inventive concept linking the subject matter of the different groups of invention is the use of a CCS52 molecule under the control of a medium strength constitutive promoter to increase plant yield or biomass.

This is not found persuasive because the technical feature that links all of the claims presented for examination is a nucleic acid encoding a CCS52 protein under the control of a medium strength constitutive promoter. However, a nucleic acid encoding a CCS52 protein under the control of a medium strength constitutive promoter is obvious over Cebolla A. et al. (The mitotic inhibitor ccs52 is required for endoreduplication and ploidy-dependent cell enlargement in plants. EMBO J. 1999 Aug 16;18(16):4476-84) in view of Norris S. et al. (The intron of *Arabidopsis thaliana* polyubiquitin genes is conserved in location and is a quantitative determinant of chimeric gene expression. Plant Mol Biol. 1993 Mar;21(5):895-906), as set forth

below, and therefore does not constitute a special technical feature as defined by PCT Rule 13.2, because it does not define a contribution over the prior art.

The traversal is additionally on the ground(s) that page 15 of the present application describes ten conserved motifs which have been identified in CCS52 proteins, the consensus sequence for each of the motifs being described in SEQ ID NOs: 7-16, such that searching with at least 4 of these motifs would enable the identification of CCS52 proteins without an undue burden.

This is not found persuasive because none of the claims presented for examination require the presence of any of the motifs set forth in the specification.

The requirement is still deemed proper and is therefore made FINAL.

Claim Objections

Claim 7 is objected to because of the following informalities: the claim is directed in part to nonelected sequences. Appropriate correction is required.

Specification

The disclosure is objected to because it contains an embedded hyperlink and/or other form of browser-executable code. Applicant is required to delete the embedded hyperlink and/or other form of browser-executable code. See MPEP § 608.01.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it

pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1, 3-7, 9-10 and 13-14 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The claims are drawn to a method of increasing plant yield or biomass comprising introduction into a plant of a nucleic acid encoding a CCS52 protein under the control of a medium-strength constitutive promoter to produce a plant having increased yield or biomass as compared to a control plant, including a method wherein said increased yield or biomass comprises increased plant size, increased organ size or increased number of organs, wherein said increased organ size is selected from increased leaf size, increased seed size or increased stem diameter, wherein said increased number of organs is selected from increased number of leaves, increased number of branches, increased number of flowers or increased number of seeds, a method wherein said nucleic acid encoding a CCS52 protein is SEQ ID NO:1 or is a variant of SEQ ID NO:1 or encodes SEQ ID NO:2 or encodes a variant of SEQ ID NO:2, and a method wherein said promoter is a ubiquitin promoter or a promoter with a similar expression pattern.

The claims are also drawn to a genetic construct comprising: (a) a CCS52 nucleic acid or a variant thereof, encoding a CCS52 protein or a variant thereof; operably linked to (b) a medium-strength constitutive promoter; and optionally (c) a transcription termination sequence, including a genetic construct wherein said promoter is a ubiquitin promoter or a promoter with a similar expression pattern, and a method for the production of a transgenic plant having

increased yield or biomass relative to corresponding wild-type plants, comprising: a) introducing into a plant cell a genetic construct.

The claims are additionally drawn to a plant obtainable by a method according to claim 1, which plant has increased yield or biomass relative to corresponding wild-type plants, and a transgenic plant containing a genetic construct, which plant has increased yield or biomass relative to corresponding wild-type plants, including monocotyledonous and dicotyledonous plants, plant parts, and progeny.

With respect to a nucleic acid encoding a CCS52 protein that, when introduced into a plant under the control of a medium-strength constitutive promoter produces a plant having increased yield or biomass as compared to a control plant, including SEQ ID NO:1 or a variant of SEQ ID NO:1, and nucleic acids encoding SEQ ID NO:2 or a variant of SEQ ID NO:2, the specification describes the structure of a single nucleic acid, designated AtCCS52A, that has the required function (increases yield or biomass when expressed under the control of a medium-strength constitutive promoter in a plant transformed therewith). The specification describes the nucleic acid designated AtCCS52A as the nucleotide sequence of SEQ ID NO:1, obtained from *Arabidopsis thaliana* and encoding the amino acid sequence of SEQ ID NO:2 (page 11; pages 38-43; sequence lasting). The specification does not describe the structure of other nucleic acids encoding a protein designated CCS52 that increase yield or biomass when expressed under the control of a medium-strength constitutive promoter in a plant transformed therewith. The specification also does not describe the structure of other nucleic acids that are variants of SEQ ID NO:1, or that encode variants of SEQ ID NO:2, and that increase yield or biomass when

expressed under the control of a medium-strength constitutive promoter in a plant transformed therewith.

With respect to a medium-strength constitutive promoter, that when introduced into a plant while controlling the expression of a nucleic acid encoding a CCS52 protein produces a plant having increased yield or biomass as compared to a control plant, the specification makes reference to "the sunflower ubiquitin promoter" (page 39), but the specification does not describe the nucleotide sequence of the nucleic acid having this designation. Additionally, a search of the prior art indicates that there is no one promoter polynucleotide that is "the sunflower ubiquitin promoter". See Binet M. et al. (Structure and expression of sunflower ubiquitin genes. Plant Mol Biol. 1991 Sep;17(3):395-407), as set forth below in the rejection of the claims for lack of enablement. Further, while the specification at page 23 makes reference by name to other promoters that are medium-strength constitutive promoters, e.g. ubiquitin promoters, the specification does not describe the nucleotide sequence of any nucleic acid having the designation "ubiquitin promoter", or specify which nucleic acids having this designation would function as claimed (when introduced into a plant while controlling the expression of a nucleic acid encoding a CCS52 protein produce a plant having increased yield or biomass as compared to a control plant, or are "a medium-strength constitutive promoter").

The Federal Circuit has clarified the application of the written description requirement to nucleic acid sequences. The court stated that "A description of a genus of cDNAs may be achieved by means of recitation of a representative number of cDNAs, defined by nucleotide sequence, falling within the scope of the genus or of a recitation of structural features common to members of the genus, which features constitute a substantial portion of the genus." See

University of California v. Eli Lilly and Co., 119 F.3d 1559, 1569; 43 USPQ2d 1398, 1406 (Fed. Cir. 1997). The court has also affirmed the PTO's applicable standard for determining compliance with the written description requirement, quoting from the PTO's Guidelines for Examination of Patent Applications Under the 35 U.S.C. 112, P1, "Written Description" Requirement, 66 Fed. Reg. 1099, 1106, where it is set forth that the written description requirement can be met by "show[ing] that an invention is complete by disclosure of sufficiently detailed, relevant identifying characteristics ... i.e., complete or partial structure, other physical and/or chemical properties, functional characteristics when coupled with a known or disclosed correlation between function and structure, or some combination of such characteristics." See *Enzo Biochem Inc. v. Gen-Probe Inc.*, 63 USPQ2d 1609, 1613 (CAFC 2002).

In the instant case Applicant has not described a representative number of species falling within the scope of the genus of CCS52 coding sequences required to practice the claimed invention, which genus encompasses numerous nucleic acids of unspecified structure that encode numerous CCS52 proteins of unspecified structure, as well as numerous nucleic acid sequence variants of SEQ ID NO:1 that encode numerous amino acid sequence variants of SEQ ID NO:2, nor the structural features unique to the genus that are correlated with the function of increasing yield or biomass when expressed under the control of a medium-strength constitutive promoter in a plant transformed therewith.

In the instant case Applicant also has not described any species falling within the scope of the genus of promoter sequences required to practice the claimed invention, which genus encompasses numerous nucleic acids of unspecified structure that when introduced into a plant while controlling the expression of a nucleic acid encoding a CCS52 protein produce a plant

having increased yield or biomass as compared to a control plant, nor the structural features unique to the genus that are correlated with the function of expressing a nucleic acid encoding a CCS52 protein at the appropriate level.

Claims 1, 3-7, 9-10 and 13-14 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

The claims are broadly drawn to a method of increasing plant yield or biomass comprising introduction into a plant of a nucleic acid encoding a CCS52 protein under the control of a medium-strength constitutive promoter to produce a plant having increased yield or biomass as compared to a control plant, including a method wherein said increased yield or biomass comprises increased plant size, increased organ size or increased number of organs, wherein said increased organ size is selected from increased leaf size, increased seed size or increased stem diameter, wherein said increased number of organs is selected from increased number of leaves, increased number of branches, increased number of flowers or increased number of seeds, a method wherein said nucleic acid encoding a CCS52 protein is SEQ ID NO:1 or is a variant of SEQ ID NO:1 or encodes SEQ ID NO:2 or encodes a variant of SEQ ID NO:2, and a method wherein said promoter is a ubiquitin promoter or a promoter with a similar expression pattern.

The claims are also broadly drawn to a genetic construct comprising: (a) a CCS52 nucleic acid or a variant thereof, encoding a CCS52 protein or a variant thereof; operably linked

to (b) a medium-strength constitutive promoter; and optionally (c) a transcription termination sequence, including a genetic construct wherein said promoter is a ubiquitin promoter or a promoter with a similar expression pattern, and a method for the production of a transgenic plant having increased yield or biomass relative to corresponding wild-type plants, comprising: a) introducing into a plant cell a genetic construct.

The claims are additionally broadly drawn to a plant obtainable by a method according to claim 1, which plant has increased yield or biomass relative to corresponding wild-type plants, and a transgenic plant containing a genetic construct, which plant has increased yield or biomass relative to corresponding wild-type plants, including monocotyledonous and dicotyledonous plants, plant parts, and progeny.

The specification at page 3 discloses that there is evidence that overexpression of CCS52 under the control of a CaMV35S promoter is detrimental, the detrimental effect being first observed in *Medicago* transgenic plants, and later in *Arabidopsis thaliana* transformed with the Arabidopsis CCS52 gene under control of a CaMV35S promoter. The specification also indicates at page 22 that "a medium-strength constitutive promoter" explicitly excludes the constitutive 35S promoter of the cauliflower mosaic virus, which is known to be a very strong promoter.

The specification at pages 38-43 discloses that the overexpression of *Arabidopsis thaliana* CCS52 AtCCS52A (the nucleotide sequence of SEQ ID NO:1 encoding the amino acid sequence of SEQ ID NO:2) under the control of an unspecified sunflower ubiquitin promoter in *Arabidopsis thaliana* plants transformed therewith results in an increase in biomass (increased leaf size, number of rosette leaves, rosette diameter and number of cauline leaves, and increased

stem thickness and branching) and an increase in seed yield (enlarged seed size), as compared to control plants. See also Figures 4-6 and 8-11.

The specification does not disclose other nucleic acids encoding other proteins designated CCS52 that increase yield or biomass when expressed under the control of a medium-strength constitutive promoter in a plant transformed therewith. The specification also does not disclose how to vary the nucleotide sequence of SEQ ID NO:1 or the amino acid sequence of SEQ ID NO:2 in a manner that the function of increasing yield or biomass when expressed under the control of a medium-strength constitutive promoter in a plant transformed therewith is retained. The specification additionally does not disclose the particular sunflower ubiquitin promoter used, or the specific identity of any other promoter that would function as claimed (when introduced into a plant while controlling the expression of a nucleic acid encoding a CCS52 protein produces a plant having increased yield or biomass as compared to a control plant).

The claimed invention is not enabled because the specification does not provide sufficient guidance with respect to particular promoters that, when introduced into a plant while controlling the expression of a nucleic acid encoding a CCS52 protein, produce a plant having increased yield or biomass as compared to a control plant. Such guidance is necessary because different types of promoters can vary significantly in their specific structural and functional attributes, even different promoters from the same gene family, and the disclosure indicates that the selection of the appropriate type of promoter is a critical design feature of the claimed invention.

See, for example, Sanders et al. (Nucleic Acids Research, 1987, Vol. 15, No. 4, pages 1543-1558), who teach that NPTII transcript levels were 30 fold higher in plants transformed with vectors comprising a DNA sequence encoding NPT II operably linked to a CaMV 35S

promoter and leader sequence as compared to plants transformed with vectors comprising a DNA sequence encoding NPT II operably linked to a nopaline synthase promoter and leader sequence (page 1543 abstract; page 1552 figure 3 ; page 1553 table 1; page 1552 figure 4).

See, for example, Binet M. et al. (Structure and expression of sunflower ubiquitin genes. Plant Mol Biol. 1991 Sep;17(3):395-407) who teach that genomic Southern blot analysis suggests that, as in *Arabidopsis*, about ten genes encode ubiquitin in sunflower (paragraph spanning pages 403-404). Binet M. et al. also teach that the organization of ubiquitin genes and the regulation of their expression seem more complex in plants than in other organisms, and that polyubiquitin genes in sunflower are distinctly regulated depending on external conditions and physiological state, suggesting the presence of regulatory elements specific to these different genes (page 405 column 2 last paragraph).

In the instant case Applicant has not provided sufficient guidance with respect to which particular promoter sequences to use to express a nucleic acid encoding a CCS52 protein in a plant such that a plant having increased yield or biomass is produced. Absent such guidance it would require undue experimentation for one skilled in the art to make such plants, as one skilled in the art would have to test a variety of different promoter sequences in a variety of different plant species in order to determine which promoter sequence, if any, can express express a nucleic acid encoding a CCS52 protein in a plant at a level that results in the production of a plant having increased yield or biomass.

The claimed invention is also not enabled because the specification does not provide sufficient guidance with respect to which CCS52 coding sequences to express in which plant species such that a plant having increased yield or biomass is produced. Such guidance is

necessary because the effect of expressing a nucleic acid encoding a CCS52 protein in a plant is unpredictable.

See, for example, Kondorosi E. et al. (Endoreduplication and activation of the anaphase-promoting complex during symbiotic cell development. FEBS Lett. 2004 Jun 1;567(1):152-7. Review), who teach that while the upregulation of ccs52A is expected to increase ploidy levels and cell and organ sizes, this could not be proven in *M. truncatula* plants, since transformation via callus formation and somatic embryogenesis did not allow overexpression of ccs52A, likely because Ccs52A inhibits cell proliferation, whereas in *Arabidopsis* plants, a slight overproduction of the Ccs52A protein was possible, confirming a direct correlation between ccs52A expression levels and degrees of ploidy in different cell types and organs (page 156 column 2 third full paragraph).

In the instant case Applicant has not provided sufficient guidance with respect to which CCS52 coding sequences to express in which plant species to produce transgenic plants having increased yield or biomass. Absent such guidance it would require undue experimentation for one skilled in the art to use CCS52 coding sequences, as one skilled in the art would have to test a variety of different CCS52 coding sequences in a variety of different recombinant genetic constructs in order to determine which CCS52 coding sequence, if any, increases plant yield or biomass.

The claimed invention is additionally not enabled because the specification does not provide sufficient guidance with respect to how to vary the nucleotide sequence of SEQ ID NO:1 or the amino acid sequence of SEQ ID NO:2 in a manner that the function of increasing yield or biomass when expressed under the control of a medium-strength constitutive promoter in a plant

transformed therewith is retained. Such guidance is necessary because the functional effect of varying a nucleotide or amino acid sequence is unpredictable.

See, for example, Hill M.A. et al. (Functional analysis of conserved histidines in ADP-glucose pyrophosphorylase from *Escherichia coli*. Biochem Biophys Res Commun. 1998 Mar 17;244(2):573-7), who teach that when two of three histidines that are maintained in ADP-glucose pyrophosphorylase across several species are substituted with the "nonconservative" amino acid glutamine, there is little effect on enzyme activity, while the substitution of one of those histidines with the "conservative" amino acid arginine drastically reduces enzyme activity (see Table 1).

See also, for example, Rhoads D.M. et al. (Regulation of the cyanide-resistant alternative oxidase of plant mitochondria. Identification of the cysteine residue involved in alpha-keto acid stimulation and intersubunit disulfide bond formation. J Biol Chem. 1998 Nov 13;273(46):30750-6), who teach that mutation of Cys-128 to Ala in an *Arabidopsis* alternative oxidase caused a pronounced overall increase in enzyme activity relative to the wild-type in the presence or absence of pyruvate (page 30753 Figure 3), whereas mutation of Cys-78 to Ala in the same *Arabidopsis* alternative oxidase resulted in a minimally active enzyme that showed no response to added pyruvate (page 30753 Figure 3).

In the instant case Applicant has not provided guidance with respect to which nucleotide or amino acid sequence variants to produce transgenic plants having increased yield or biomass. Absent such guidance it would require undue experimentation for one skilled in the art to use variants of SEQ ID NO:1 or SEQ ID NO:2, as one skilled in the art would have to test a variety

of different variants in a variety of different recombinant genetic constructs in order to determine which variant sequence, if any, increases plant yield or biomass.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1 and 10, and claims dependent thereon, are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claims 1 and 10 are indefinite in their requirement for a "medium-strength" constitutive promoter, "medium-strength" is a relative term lacking a comparative basis.

Claim 9 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 9 is indefinite in its dependence on claim 8 which is cancelled.

Claims 9 and 12 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claims 9 and 12 are indefinite in its requirement for a ubiquitin promoter or a promoter with a "similar" expression pattern. It is unclear what types of promoters are encompassed by the claim, as no particular ubiquitin promoter is referred to as the basis for the comparison, nor is the way in which the promoters are similar specified.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim 20 is rejected under 35 U.S.C. 102(b) as being anticipated by Cebolla A. et al. (The mitotic inhibitor ccs52 is required for endoreduplication and ploidy-dependent cell enlargement in plants. EMBO J. 1999 Aug 16;18(16):4476-84).

Claim 20 is drawn to a progeny of a plant as defined in claim 15.

Cebolla A. et al. teach *Medicago trunculata* plants (page 4483). While Cebolla A. et al. do not explicitly teach that their plants are "progeny of a plant as defined in claim 15", Cebolla A. et al. need not explicitly teach this limitation in order to anticipate the rejected claim, since the claim does not limit the progeny to progeny that have the phenotype of, and comprise the transgene introduced into, the parent plant. Due to Mendelian inheritance of genes, a single transgene introduced into the parent plant would only be transferred to half of the progeny of that plant, such that the claim encompasses even those progeny that are not transgenic.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 10 and 12-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cebolla A. et al. (The mitotic inhibitor ccs52 is required for endoreduplication and ploidy-dependent cell enlargement in plants. EMBO J. 1999 Aug 16;18(16):4476-84) in view of Norris S. et al. (The intron of *Arabidopsis thaliana* polyubiquitin genes is conserved in location and is a quantitative determinant of chimeric gene expression. Plant Mol Biol. 1993 Mar;21(5):895-906).

The claims are drawn to a genetic construct comprising: (a) a CCS52 nucleic acid or a variant thereof, encoding a CCS52 protein or a variant thereof; operably linked to (b) a medium-strength constitutive promoter; and optionally (c) a transcription termination sequence, including a genetic construct wherein said promoter is a ubiquitin promoter or a promoter with a similar expression pattern, a method for the production of a transgenic plant having increased yield or biomass relative to corresponding wild-type plants, comprising: a) introducing into a plant cell a genetic construct according to claim 10; b) cultivating said plant cell under conditions promoting plant growth, and a host cell containing a genetic construct.

Cebolla A. et al. teach a genetic construct comprising a CCS52 nucleic acid encoding a CCS52 protein obtained from *Medicago trunculata* operably linked in an antisense orientation to a the constitutive 35S promoter of the cauliflower mosaic virus, a host cell containing the genetic construct, and *Medicago trunculata* plants transformed with the genetic constructs that have a decreased number of endocycles and decreased cell volume (page 4479 column 2; page 4481 Figure 4; page 4483 column 2). Applicant's specification indicates at page 22 that "a medium-strength constitutive promoter" explicitly excludes the constitutive 35S promoter of the cauliflower mosaic virus.

Cebolla A. et al. do not teach a genetic construct comprising a ubiquitin promoter. Further, while Cebolla A. et al. do not teach that their method is "for the production of a transgenic plant having increased yield or mass" as recited in the preamble of claim 13, the limitation recited in the preamble of claim 13 is an intended use and thus nonlimiting.

Norris S. et al. teach genetic constructs comprising *Arabidopsis thaliana* ubiquitin promoters (page 899 Table 1; page 900 Figure 2; page 901 Table 2). Norris S. et al. also teach that the constitutive expression of the ubiuitin promoters indicates their utility for the expression of marker enzymes and other coding regions in dicots (page 904 column 2).

Given the teachings of Cebolla A. et al. that a CCS52 nucleic acid encoding a CCS52 protein obtained from *Medicago trunculata* can be expressed in an antisense orientation under the constitutive 35S promoter of the cauliflower mosaic virus in a plant transformed therewith, and given the teachings of Norris S. et al. that *Arabidopsis thaliana* ubiquitin promoters are useful for the constitutive expression of marker enzymes and other coding regions in dicotyledonous plants, it would have been *prima facie* obvious to one skilled in the art at the time the invention was made to make a genetic construct comprising a CCS52 nucleic acid encoding a CCS52 protein operably linked to an *Arabidopsis thaliana* ubiquitin promoter. One skilled in the art would have been motivated to do so in order to assess the phenotypic effect of expressing a CCS52 nucleic acid using a promoter other than the constitutive 35S promoter of the cauliflower mosaic virus. One skilled in the art would have had a reasonable expectation of success given the success of Cebolla A. et al. in expressing a CCS52 nucleic acid using a 35S promoter of the cauliflower mosaic virus, and given the success of Norris S. et al. in expressing other nucleic acids using *Arabidopsis thaliana* ubiquitin promoters. Accordingly, one skilled in the art would

have been motivated to generate the claimed invention with a reasonable expectation of success. Thus, the claimed invention would have been *prima facie* obvious as a whole to one of ordinary skill in the art at the time the invention was made.

Remarks

Claims 1-7 and 15-20 are deemed free of the prior art of record, due to the failure of the prior art to teach or suggest a nucleic acid encoding a CCS52 protein operably linked to a promoter wherein the nucleic acid is expressed in a plant transformed therewith at level that increases the yield or biomass of the plant.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Cynthia Collins whose telephone number is (571) 272-0794. The examiner can normally be reached on Monday-Friday 8:45 AM -5:15 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Anne Marie Grunberg can be reached on (571) 272-0975. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would

like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Cynthia Collins/
Primary Examiner, Art Unit 1638

CC